CAC Report

Longview Drinking Water Supply Improvement Study

Prepared for

City of Longview / Beacon Hill Water and Sewer District

July 2015

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Contents

Executive Summary ..... **i**

1. Project Definition/Background **1**
Background 1

2. Description of CAC Process **3**
Formation of CAC 3
CAC Chartering, Protocols, and Process 4
Evaluation Criteria 6
Alternatives Considered 7
Evaluation Process and Results 9

3. Public Outreach **11**

4. CAC Recommendations **14**

5. Project Implementation **15**

Appendices

A. CAC Application Form
B. CAC Meeting Protocols
C. Options Evaluation Framework
D. Complete List of Water Supply Improvement Options Considered
E. Water Supply Improvement Options Evaluation and Costs
F. Project Fact Sheet and Water Supply Alternatives Explanatory Insert

Executive Summary

In response to a significant increase in customer complaints related to spotting, taste, odor and health concerns following the transition of the drinking water supply, the City of Longview and Beacon Hill Water and Sewer District commenced a study to evaluate options for improving water quality. This study included two primary components: a comprehensive and deliberate community outreach program, and a technical element to develop and evaluate potential water supply options.

A cornerstone of the study process was the formation and deliberation of a fourteen member Customer Advisory Committee (CAC). The committee considered a wide range of possible water supply options that stemmed from research by the technical consultant, as well as input from city staff, CAC members and the community. The initial list included more than 50 possible courses of action, which were grouped to make it manageable to consider benefits and drawbacks. The entire range of options can be organized in the following categories:

- Stay the course / no change
- Modified treatment of the existing well water source or changes in the distribution/transmission system
- Change to a surface water source – options included direct withdrawal, Ranney collector, aquifer storage & recovery, and blending surface water with groundwater
- Buy water from or collaborate with another entity
- End user treatment at the individual home/business level
- Non-infrastructure products and education to deal with water issues

Following a robust public involvement effort and considering input from the community, the committee determined at their eighth and final meeting by a consensus decision to recommend that the City Council proceed with implementation of a Ranney Collector on the Cowlitz River. The CAC selected this option as their preferred alternative because it would alleviate customer issues with spotting and water hardness, as well as avoid complex permitting and regulatory requirements related to smelt and sediment. Some members of the committee also felt a drinking water source using a Ranney Collector on the Cowlitz River would have less risk of toxic contamination from industrial land uses.

The CAC recommendation will be presented to a joint meeting of the City Council and District Board on August 20, 2015.

1. Project Definition/Background

Background

In 2013, the water supply serving the City of Longview and Beacon Hill Water and Sewer District was switched from a surface water source on the Cowlitz River to a groundwater source from the Mint Farm wellfield. Several factors contributed to the need to consider a new water supply:

- The Fishers Lane Water Treatment Plant, built in 1946, was failing and needed extensive upgrades (estimated at $53 million)
- Summer demands regularly exceeded plant capacity
- Increased water supply was needed for future growth
- Cowlitz River sediment was causing major equipment problems
- The water intake structure was in need of extensive improvements to meet fish protection regulations

Over the course of nearly four years, extensive analysis and testing of possible surface and groundwater sources were performed. Ten primary options were considered, including rehabilitating the Fishers Lane plant. During the evaluation process, information was distributed to the community via newsletters, open houses, bill inserts, videos, public service announcements, newspaper articles, as well as during city council meetings and workshops.

Eventually, the Mint Farm wellfield was selected as the best option for meeting the City's long-term water supply needs. Design and construction of the Mint Farm facilities got underway in 2009, with a final total cost of $34 million.

After the new supply was activated in 2013, customers began experiencing problems with the water. The most common issues expressed included:

- Spots and residue
- Bad taste
- Color and staining
- Smell
- Indirect costs, such as damage to appliances and buying bottled water
- Fear of health impacts

In response to complaints, the City of Longview and BHWSD began this study to evaluate options for improving water quality. This project included two primary components: a comprehensive and deliberate community outreach program; and a technical element to develop and evaluate potential water supply options. The specific tasks in each of these categories are described under Task 1 and Task 2 in the box to the side.

In August 2014, the Longview City Council authorized the study to be performed by CH2M with subconsultant JLA Public Involvement. Commencement of most study activities was postponed until results of the statistically valid customer survey were received. The survey, described in more detail in Section 3, found that 82 percent of the survey respondents were dissatisfied with their water. After receiving the survey information, the City Council approved getting underway with other elements of the study.

Task 1: Community Outreach

- Develop detailed public communications plan
- Identify key stakeholders
- Recruit and recommend City Council-appointed Customer Advisory Committee
- Other activities
  - Statistically valid community survey
  - Custom website and online polling
  - In-person and Virtual open house
  - Fact sheets and FAQ's
  - Media releases and Public Service Announcements
  - Community survey
  - Stakeholder interviews
  - Public open house

Task 2: Develop and Evaluate Water Supply Alternative

- Conduct concurrent technical evaluation
- Review existing documents
- Confirm water supply needs
- Develop alternatives
- Identify fatal flaws
- Assess cost to restart and rehab Fishers Lane plant
- Evaluate water supply options (desktop evaluation)
- Develop preferred option(s)
- Document recommendations

2. Description of CAC Process

Formation of CAC

The Longview City Council and Beacon Hill Water & Sewer District Board of Commissioners formed a Customer Advisory Committee (CAC) to learn about the water supply system, consider options to improve the community's water, and make a water supply recommendation to the City Council and District board. The CAC was a cornerstone of the overall public outreach that was conducted as part of the study; details of the public outreach program are described in Section 4 of this report.

Recruitment of the CAC members included public notices about formation of the committee, an application, a structured evaluation process, and a recommendation to the City Council and District Board. Publicity of the recruitment process was provided through notices on the City's website, reader boards on Longview streets, flyers, and newspaper ads to encourage applications from interested members of the community. The application form requested general information about the applicant's background and length of residence in the area; it also asked specific questions about availability to attend meetings, reasons for participating, commitment to group process, community engagement, and outlook for the committee. The complete application form is attached in Appendix A.

Nearly 100 applications were received. The consultant team reviewed the applications, and the names of the applicants were not known to the evaluators, providing anonymity to the evaluation process. The applications were sorted into service area zones to ensure area-wide distribution, and the highest scoring applicants were identified in each service area zone. Fourteen applicants were selected from the evaluation process for recommendation to the City Council, twelve from the Longview community and two from the Beacon Hill service area. This ratio is similar to the relative number of customers served by Longview and Beacon Hill. The City Council approved the recommended CAC membership for the City. The BHWSD Board interviewed four of the recommended applicants and selected two for the CAC.

The committee represented multiple interests and backgrounds. Members included residents from various neighborhoods, business owners, healthcare providers, and environmental or engineering professionals, all to represent the community at large. There was diversity in gender and age group, as well. One liaison representative each from the Longview City Council and the Beacon Hill Water & Sewer District Board participated in the CAC discussions, but did not participate as "voting" members.

The CAC was charged with understanding the issues and available data, providing input regarding community goals, and making a recommendation to City Council and District Board on the next steps for the water supply. The group had full access to the technical information, which allowed the committee members to grow in their understanding of the issues and options as the study progressed.

CAC Chartering, Protocols, and Process

In its first meeting, the CAC heard descriptions of the conditions that led up to the Water Supply Improvement Study, Council and Board expectations of the CAC, and the public involvement plan that would be implemented in conjunction with the CAC process.

Also as part of its first meeting, the CAC engaged in a visioning and chartering activity to describe their respective and collective views about the CAC's charge. Committee members were asked a series of questions to elicit responses about their vision of the future. Members of the public attending the meeting were invited to provide answers to the questions, too. The primary questions were these:

- What opportunities do you see as a result of this study process? What positive outcomes are possible? For the CAC? For the community?
- What is most important in terms of improving Longview's drinking water? What do you hope to accomplish as a result of the study?
- What one word describes your greatest aspiration for this study process?

The background information and visioning activity were captured in a "Graphic Recording" for each of those segments. The graphics of the background and visioning topics are shown in Figures 1 and 2.

From this discussion, and as refined in a subsequent meeting, the committee arrived at this description of what it is to accomplish: **The goal of the Customer Advisory Committee is to provide a recommendation for a sustainable, safe and satisfactory water supply for Longview/BHWSD water customers**.

Figure 1. The background provided at the first meeting of the CAC was recorded in this graphic

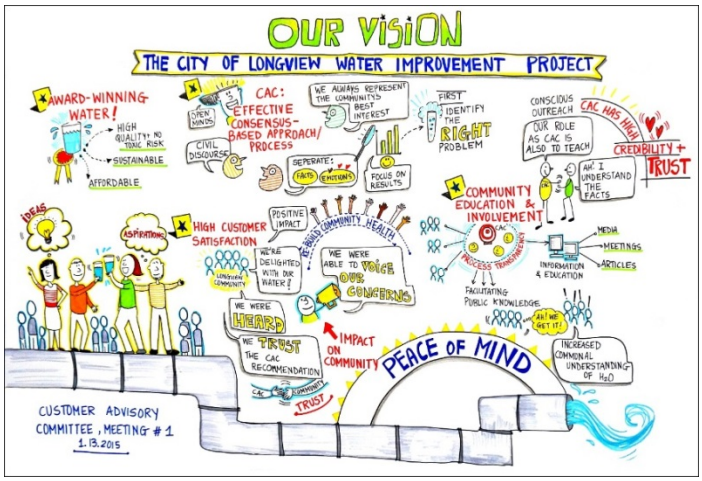


Figure 2. The CAC's vision for the drinking water improvement study was captured in this graphic recording

A series of seven meetings was laid out at the beginning of the CAC's process The CAC met regularly in order to comprehend complicated information and build their understanding of complexities associated with the water supply options. The committee toured the Fisher's Lane plant and the Mint Farm plant during one of its meetings to gain an on-the-ground understanding of the two facilities. An eighth meeting of the group was held to conclude its recommendations following an opportunity for public input on the CAC's preliminary recommendation. The schedule for the study process, including the eight CAC meetings, is shown in Figure 3.

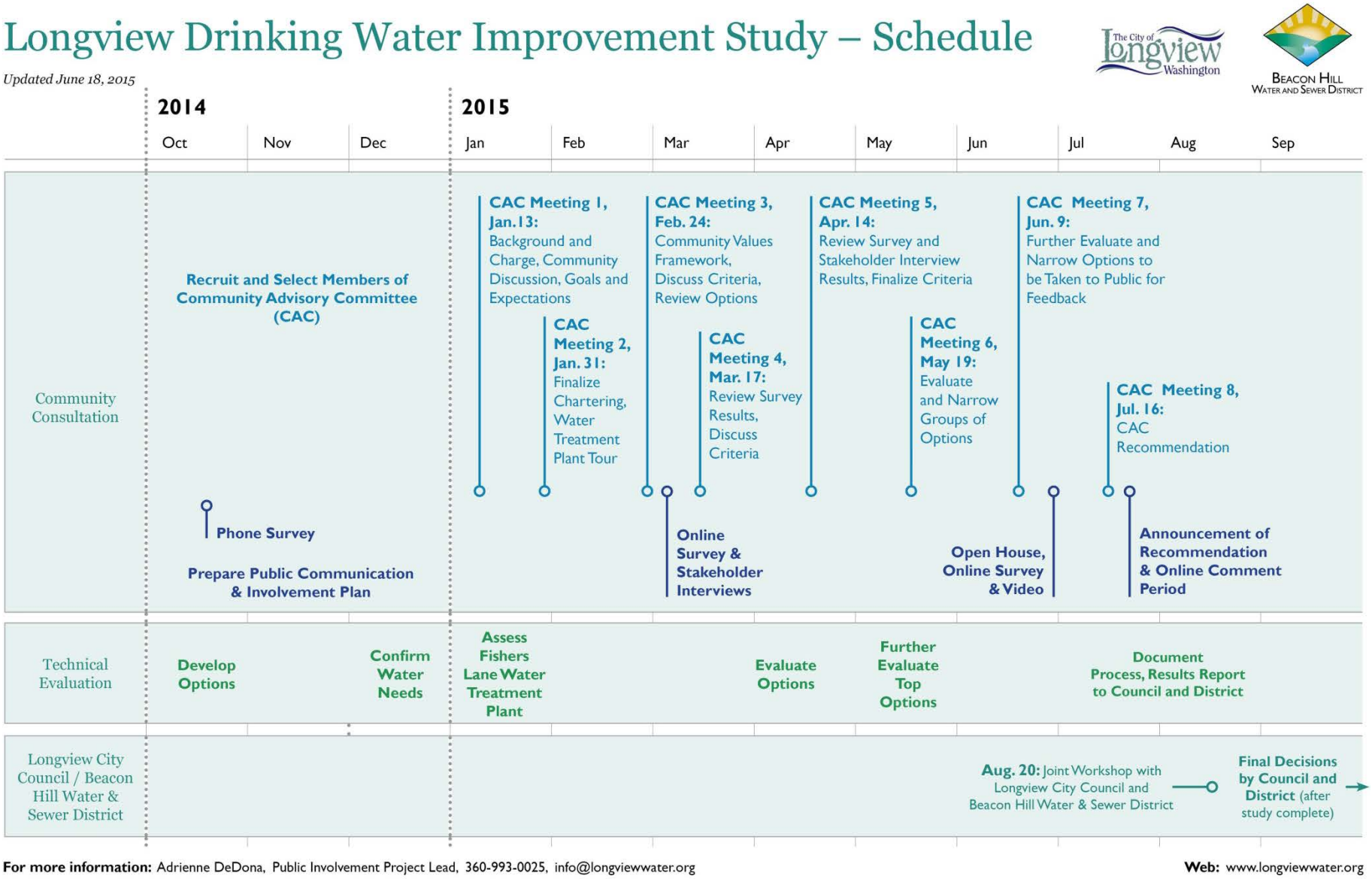


Figure 3. Schedule for the study process

The CAC adopted a set of protocols that described the members' agreement on several operational topics. These included the committee's purpose, role, and decision-making process – which included recognition that the CAC would make *recommendations* for Council and Board decisions, individual members' responsibilities to the committee, stipulated how communications between meetings would be completed, and explained accessibility to the public. The full meeting protocols are incluced in Appendix B.

All CAC meetings were open to the public, were publicly announced, and included an opportunity for public comment. Public attendance at the meetings varied from a half dozen to over 50.

Meeting summaries from all CAC meetings are available on the project website at http://longviewwater.org/page/cac.

Evaluation Criteria

Three primary characteristics that a water supply recommendation should meet were identified in the visioning exercise – High Quality/No Toxic Risk, Sustainable, and Affordable. These were designated as the key values and were related to categories of Customer Perception, Technical Feasibility, and Cost. Together, they served as the basis for establishing criteria that would be used to evaluate options for improving the water supply.

The key values were summarized in this way:

Key Value #1: Improve **customer perception** about the water supply with respect to it being high quality and having no toxic risk. Includes taste, smell, spotting and health concerns.

Key Value #2: The recommendation should be **technically feasible** and have **long-term viability**. Includes long-term capacity, reliability, operability and permitting considerations.

Key Value #3: Consider the **cost and affordability** of water, both in terms of rates and indirect costs to customers for bottled water, appliance repair, in-home treatment or other similar costs.

Several criteria were identified to characterize each of the key values. These all reflected the values and concerns that were expressed in the customer survey, described in public comment, and in other anecdotal information collected by the CAC members. The CAC included criteria to recognize the indirect costs to customers due to effects of the water supply and to anticipate potential effects on property values or the potential for litigation. The criteria are shown in relation to their respective value categories in the box to the right.

The CAC also prioritized the criteria by assigning weights to each of the eighteen criteria. Committee members completed the

Value Categories and Evaluation Criteria

Customer Perception (High Quality, No Toxic Risk)

- Spotting/Residue*
- Taste*
- Color/particulates/staining*
- Smell*
- General Health Concerns*
- Purity/Cleanliness*

Technical Feasibility and Long-term Viability (Sustainable)

- Long-term Capacity
- Reliability, including seismic and other natural events, and man-made events
- Environmental impacts
- Time to permit, construct, and implement
- Difficulty to Meet Regulatory Requirements
- Time it Takes to Transition from Current Supply to Different Supply
- Governance Agreements
- Operability/Complexity

Cost* (Affordable)

- Impact on Customer Rates, including capital costs, operating costs, and transition costs
- Indirect Cost to Customers
- Effect on Property Values
- Potential Litigation Cost to City

*Criterion identified from Customer Survey

weighting exercise between meetings, following discussion of their intent during meeting 4. Figure 5 shows the relative ranking of the criteria based on the CAC ratings.

Finally, definitions for respective scores were developed to aid in the evaluation process. These definitions allow more consistency in scoring. The Options Evaluation Framework in Appendix C contains the complete description of the criteria, their relative weights, and scoring definitions.

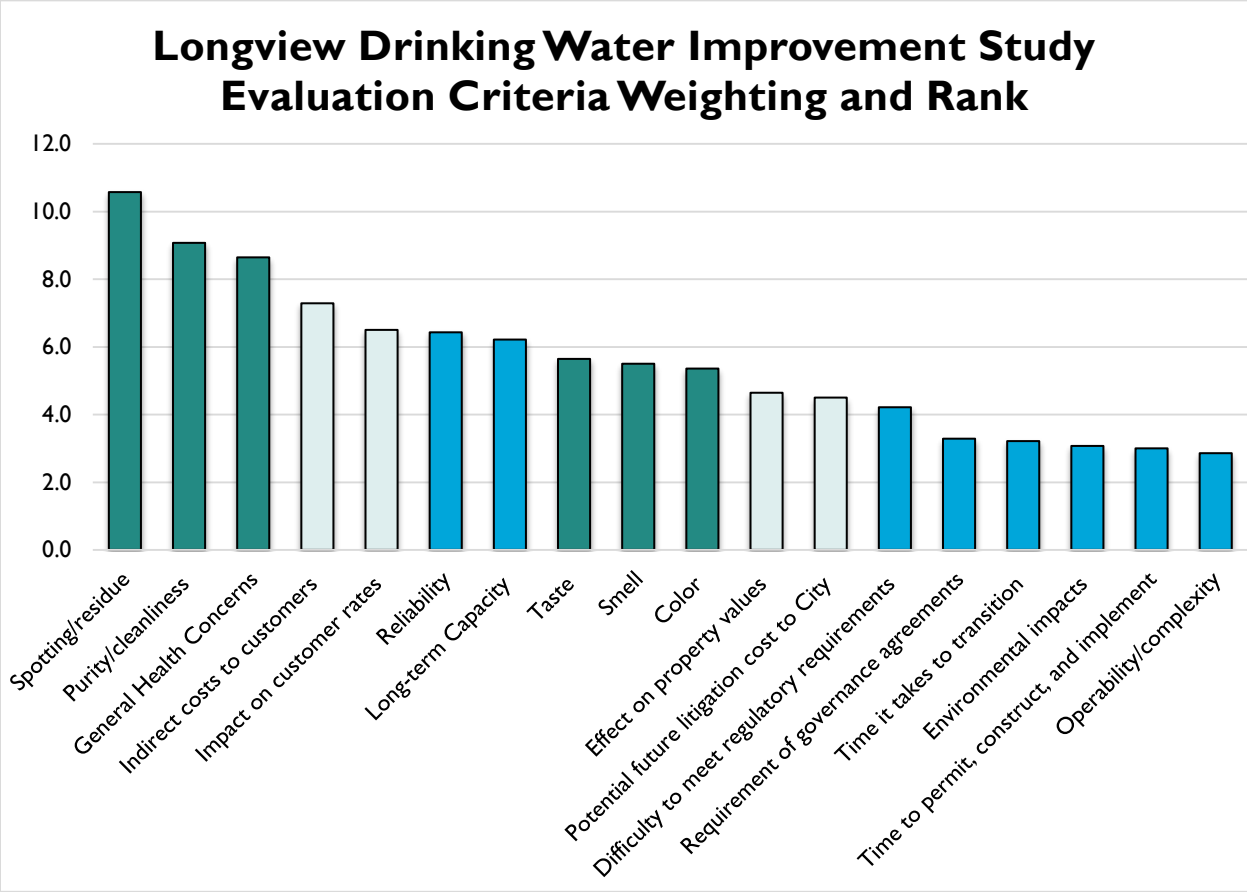


Figure 5. Relative priority of criteria based on CAC ratings
(Category color coding: Customer Perception = dark green; Technical = blue; Cost = light green)

Alternatives Considered

The consultant team proposed a list of potential options to address the water supply situation. The list included options suggested by CAC members and the public during the course of the CAC meetings. The final list included 56 potential options.

The options ranged from maintaining the status quo, to modifying the existing Mint Farm wells, to various other underground water sources, to using water from various surface water sources, including the Cowlitz River. The list also included coordination with other public and private entities, treatment at each customer's location, and non-infrastructure approaches that would employ public education.

A picture of the options list is in Figure 6. A full-size version of the list is contained in Appendix D.

Figure 6. A total of 56 options to improve Longview's drinking water were identified

Longview Drinking Water Improvement Study
Water Supply Improvement Options Complete
March 2015

Category	Source	Option ID	Description
Status Quo	Mint Farm Wellfield	A	No Additional Treatment; Optimize Existing Mint Farm Water Treatment Plant (WTP)
Wells	Mint Farm Wellfield	B	Add Dissolved Oxygen to Mint Farm WTP
		C	Add Post Chlorination to Mint Farm WTP
		D	Add Softening to Mint Farm WTP
		E	Add Silica Removal to Mint Farm WTP
		E_2	Isolate Well Screens in potential Silica strata layer(s) at Mint Farm WTP
		E_3	Utilize Scavenger Wells at Mint Farm WTP
	Unspecified Location	F	Other Groundwater Sources
Distribution/ Transmission System Changes	Mint Farm Wellfield	G	Add Chlorine Booster Stations to Distribution System
		H	Add Dissolved Oxygen Injection to Distribution System
		I	Replace Pipes in Distribution System
		J	Mint Farm WTP Finished Water Conveyed to Fishers Lane for Connection to Distribution System
Surface Source	Cowlitz River	K	Rehabilitate Fishers Lane WTP and Existing Intake
		L	Rehabilitate Fishers Lane WTP with New Cowlitz River Intake Near Existing (within 5 miles +/-)
		M	Rehabilitate Fishers Lane WTP with New Cowlitz River Intake above Toutle River
		N	Replace Fishers Lane WTP with New Cowlitz River Intake Near Existing (within 5 miles +/-)
		O	Replace Fishers Lane WTP with New Cowlitz River Intake above Toutle River
		P	Rehabilitate Cowlitz River Intake; Treat at Mint Farm WTP
		Q	New Cowlitz River Intake (within 5 miles +/-); Treat at Mint Farm WTP
		R	Rehabilitate Cowlitz River Intake; Clarification at Fishers Lane and Filtration at Mint Farm WTP
		S	New Cowlitz River Intake (within 5 mi +/-); Clarification at Fishers Lane and Filtration at Mint Farm WTP
	Columbia River	T	Columbia River Intake with New WTP
		U	Columbia River Intake; Treat Water at Mint Farm WTP
		V	Columbia River Intake; Treat Water at New/Rehabilitated Fishers Lane WTP
	Unspecified Location	W	New Upland Water Source with Surface Dam and Treatment
	Aqueduct	W_2	Conveys surface water to treatment plant in open channel
Ranney Collector	Cowlitz River	X	Ranney Collectors on Cowlitz River Downstream; Treat at Fishers Lane WTP
		Y	Ranney Collectors on Cowlitz River Downstream; Treat at Mint Farm WTP
		Z	Ranney Collectors on Cowlitz River Downstream with new WTP at New Location
		AA	Ranney Collectors near Fishers Lane; Treat at Fishers Lane WTP
		AB	Ranney Collectors near Fishers Lane; Treat at Mint Farm WTP
		AC	Ranney Collectors near Lexington; Treat at Fishers Lane WTP
		AD	Ranney Collectors near Lexington; Treat at Mint Farm WTP
		AE	Ranney Collectors and new WTP near Lexington
	Columbia River	AF	Ranney Collectors on Columbia River; Treat at Mint Farm WTP
		AG	Ranney Collectors on Columbia River; Treat at Fishers Lane WTP
		AH	Ranney Collector on Columbia River with WTP at New Location
	Kalama River	AI	Ranney Collector on Kalama River
Aquifer Storage & Recovery (ASR)	Cowlitz River	AJ	ASR at Mint Farm WTP; Rehabilitate Fisher's Lane WTP and Intake
	Cowlitz River	AK	ASR at Mint Farm with New Cowlitz River Intake and WTP
	Cowlitz River	AL	ASR at Mint Farm with Cowlitz River Ranney Collector
	Columbia River	AM	ASR at Mint Farm with Columbia River Ranney Collector
	Columbia River	AN	ASR at Mint Farm with Columbia River Intake and Treatment
Blending	Cowlitz River and Mint Farm	AO	Cowlitz River Blending with Mint Farm WTP; Surface Intake or Ranney Collectors
	Columbia River and Mint Farm	AP	Columbia River Blending with Mint Farm WTP; Surface Intake or Ranney Collectors
Regional/ Intergovernmental	Cowlitz River	AQ	Connect to City of Kelso System
		AR	Joint Expansion with City of Kelso; Ranney Collectors and Treatment
	Columbia River	AS	Connect to Port of Kalama Ranney Collector
	Kalama River	AT	Connect to City of Kalama Ranney Collector
Private/Public Partnership	Columbia River	AU	Utilize Weyerhaeuser or Kapstone Surface Water System
End User Treatment	Mint Farm Wellfield	AV	Customer Treatment Systems - Whole house, City-owned
		AW	Customer Treatment Systems - Whole house, Resident-owned
		AX	Customer Treatment System at the Faucet, Resident-owned
Non-Infrastructure	Mint Farm Wellfield	AY	Conduct Public Education about Water Purity, Safety, Aesthetics, Comparisons with Other Cities
		AZ	Conduct Public Education about Using Hard Water, Preventing and Removing Water Spots
		BA	Provide Products for Preventing and Removing Water Spots

Evaluation Process and Results

The evaluation process began with looking at the options in six broad groups. These groups accumulated options that were similar, in that they relied on the existing groundwater supply, a new surface supply, collaborating with another entity, treatment at the end-user location, or public education. The CAC evaluated the options using the established criteria, with the goal of arriving at consensus on scoring each grouping of options. Capital, operating, and maintenance costs were estimated for all the options and converted into monthly costs for a typical customer. The cost estimates were based on information available and were of sufficient accuracy to be comparable among the options, but were not necessarily concise estimates of the actual cost. The CAC scores were accumulated in a decision support model that displayed the results in graphic form to aid with interpretation.

The scores for the supply option groups are shown in Figure 7.

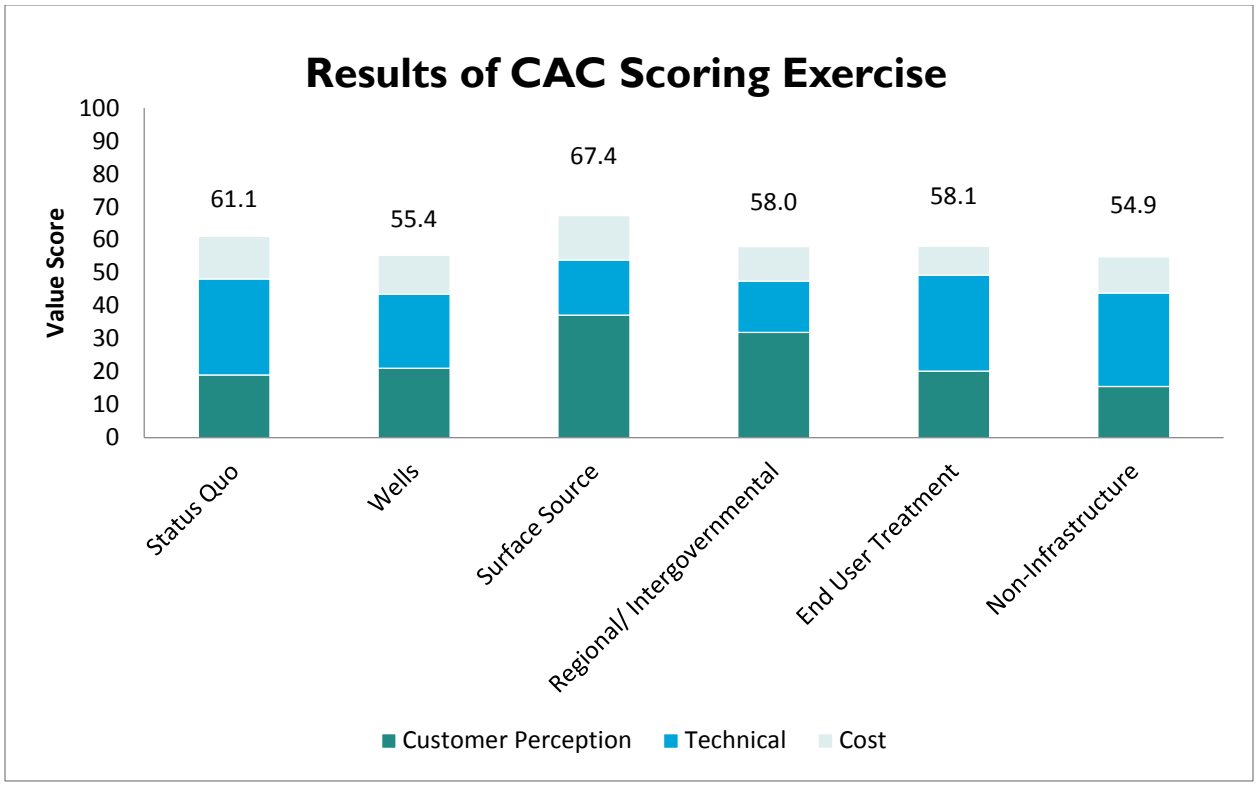


Figure 7. Results of the CAC scoring exercise showed that the group of surface source sptions had the highest value score

After considering the initial results, the CAC eliminated options contained in these three groups:

Group 4 - Buy Water from or Collaborate with Another Entity
Group 5 - End user treatment
Group 6 - Non-infrastructure

Removing the options in these groups reduced the number of options remaining under consideration to 45 (from 56). The consultant team prepared a table indicating the criteria met by each option met and showing costs for each option. The table is attached as Appendix E. The 45 options were grouped into 14 clusters to facilitate comparison among them. As with the groups created previously, the individual options within the clusters had enough similarities to be considered together. The CAC determined that it did not have the expertise to decide among the various options, but had enough information to decide which cluster or clusters of options should be recommended to the City Council for further consideration. The 14 clusters are shown in the box below.

Clusters of improvement options remaining first round of CAC elimination

1. Mint Farm Wells – No Additional Treatment – Optimize Existing
2. Mint Farm Wells – Modify the Existing Source
3. New Wellfield – Other Groundwater Sources
4. Mint Farm Wells – Modify Distribution System
5. New surface water Source – Cowlitz River
6. New Surface Water Source – Columbia River
7. New Surface Water Source – Other options
8. Ranney Collector – Cowlitz River
9. Ranney Collector – Columbia River
10. Ranney Collector – Kalama River
11. Aquifer Storage and Recovery (ASR) – Cowlitz River
12. Aquifer Storage and Recovery (ASR) – Columbia River
13. Blending – Cowlitz River
14. Blending – Columbia River Governance Agreements

The CAC members individually ranked the 14 clusters from 1 through 14, with 1 being the highest. Results of the committee member scoring identified the top six options:

1) Ranney Collector on Cowlitz River
2) Ranney Collector on the Columbia River
3/4) Modified Treatment of Mint Farm Water / Ranney Collector on Kalama River (tied)
5) Surface Water Source on Cowlitz River
6) Blending Cowlitz River Water with Mint Farm Water

Concerns were expressed about potential contamination of the Columbia River and the Mint Farm aquifer. The distance to the Kalama River and questions about the amount of water available were cited as concerns with the Kalama River source. After discussion of the top six options, **the CAC decided to carry forward the New Surface Water Source (Cowlitz River) and Ranney Collector (Cowlitz River) categories as their preferred options.** These options were carried forward to the public open house described in Section 3.

3. Public Outreach

In the CAC's pursuit of understanding the range of options to address future drinking water quality, it was important to conduct a robust community outreach and involvement program that developed broad public awareness of the study process and provided a forum for the community to provide input on the water supply options being considered. As described earlier, the CAC was a cornerstone of the outreach and involvement program, with all CAC meetings being open to the public and all meetings including a time for public input. Members of the public took the opportunity to comment at each meeting.

Several activities were performed in support of the community outreach and involvement program for this project. These activities were designed and conducted to create transparency to the CAC process, produce information useful in the CAC's deliberations, and to assist with informing the community about the water improvement study. Each of the activities are described below.

Customer Advisory Committee (CAC) Meetings – CAC meetings were well attended by the public and served as a forum for gathering up-to-date project information and for providing feedback on the water supply alternatives being considered. Meeting summaries were also published on the project website for the public to view. These summaries are available at http://longviewwater.org/page/cac.

Figure 8. The CAC met eight times

Statistically Valid Survey – A statistically valid telephone survey was conducted among residential and business customers at the outset of the project to determine the extent and intensity of community concern regarding the water. Data collection took place from October 2nd through October 11th, 2014. Respondents were chosen at random within 8 geographic service area zones to ensure the sample was representative of each respective provider's service boundaries. Only one interview was conducted per household. . A total of 461 interviews were conducted, for a margin of error of +/-4.5% at a 95% level of confidence. Overall, the survey found that satisfaction with the water quality was low, with respondents giving it a mean rating of 4.5 out of 10. Water customers were asked to share any concerns, issues or areas of dissatisfaction they had with their current water supply. The vast majority of customers had at least one issue with their current water quality. Among the top concerns of all customers:

- Spots and residue (49%)
- Taste (40%)
- Color and staining (29%)
- Smell (22%)
- Damaging appliances (18%)

Customers were asked their level of support for three possible water rate increases in order to improve the quality of water, with 50% of respondents indicated they would probably or strongly support a $5 per month increase; 40% a $10 per month increase; and 25% a $20 per month increase.

Project Website – A customized web site was established for the project at www.longviewwater.org that allowed interested parties to access information, share their thoughts and follow study progress. The website was regularly updated with project information, news articles, meeting announcements, committee meeting summaries, technical reports, etc. Members of the public were able to contact the project team and/or committee members via the project website as well as sign-up to receive project e-mail updates.

Figure 9. The project website provided up-to-date information

From the time the web site was activated, on August 1, 2014, through July 26, 2015, a total 4,941 visits to the site were counted, which includes new and returning visitors. The most single-day traffic was recorded on March 5, 2015, with 295 visitors. This coincided with the March 4, 2015, release of the first online survey. Details of the page views are shown in the box to the right.

Most-Viewed Project Website Pages

8,889 page views (total number of pages viewed). The most viewed pages were:

- Home page (6,276)
- CAC (527)
- About (506)
- FAQs (286)
- Library (206)
- Considering Options to Improve Our Drinking Water (164)

Stakeholder Contact Database – A list of interested parties and contact information was developed from CAC applicants and those who signed up to receive project updates. Over 700 contacts were collected and contacted through the course of the project. Several e-mail notifications were sent to these contacts, including invitations to participate in each of the online surveys and the open house.

CAC Survey No. 1 – Community feedback on the evaluation criteria was sought prior to being adopted by the CAC and used to evaluate the water supply improvement options. A community survey was made available online March 4 through March 15, 2015 and distributed to project stakeholders through the e-mail distribution list (135 e-mails), the project website, a media release, an article in The Daily News on March 4, and roadside reader boards. Hard copies of the survey were available at City Hall for pick-up and drop-off.

Figure 10. Readerboards helped announce the survey

A total of 1,006 people took this survey either online or via hard copy forms. There was a wide distribution of respondents across the Longview/BHWSD water service areas.

Overall, General Health Concerns and Purity/Cleanliness received the most "very important" ratings among all of the 16 criteria (901 respondents and 893 respondents, respectively, rated these criteria "very important"). Taste was a close third with 879 "very important" responses.

When comparing the criteria within the three categories (Customer Perspectives, Technical Feasibility/Long-Term Viability, and Cost), the criteria within the Customer Perspectives category had

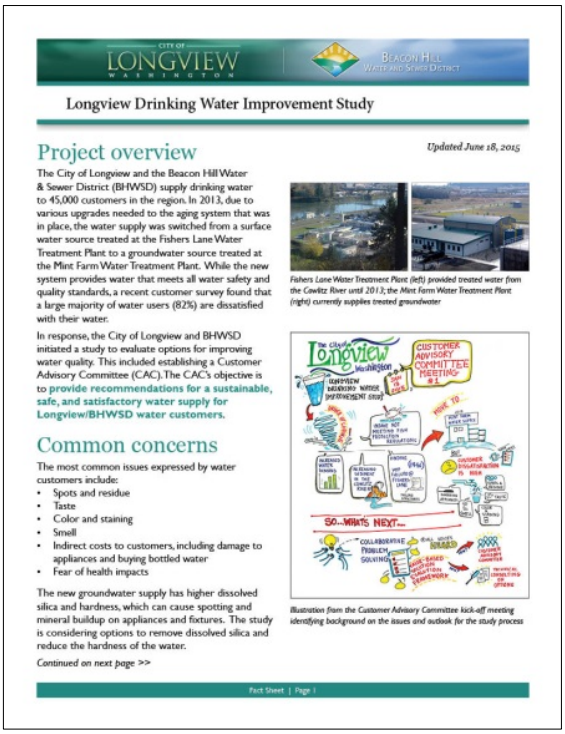
the largest numbers of "very important" ratings, with an average of 866 (or 43%) "very important" responses.

Stakeholder Interviews – Between March 11 and March 23, 2015, eight key community stakeholders were interviewed. These stakeholders were identified by the CAC based on their special knowledge, expertise or experience with the water supply. The interviews were conducted after the draft evaluation criteria were established by the CAC, and the initial list of options to improve the water was assembled. Each member was asked the same set of questions. The main purpose of the interviews was to gather insight on the study evaluation criteria and possible water supply improvement options that would help inform the CAC's decision-making process.

Nearly everyone interviewed was satisfied with the set of Evaluation Criteria. For the most part, people felt the initial list of water supply improvement options was complete; nothing new needed to be added. Even though interviewees were not asked about their preferences, several expressed their opinion about which options they favored over others, such as going back to the Cowlitz River as a source, utilizing a Ranney Collector System on the Cowlitz, or treating the Mint Farm water source to remove silica.

Most people felt that silica and spotting was the primary problem experienced with Longview's drinking water.

Overall, interviewees seemed to support the Study process and were hopeful of the outcomes of the CAC's work. When asked if interviewees would like to attend a future meeting and participate in a discussion with the CAC most replied that they are regularly attending meetings and feel satisfied with their participation during public comment.



Longview Drinking Water Improvement Study

Project overview

Updated June 18, 2015

The City of Longview and the Beacon Hill Water & Sewer District (BHWSD) supply drinking water to 45,000 customers in the region. In 2013, due to various upgrades needed to the aging system that was in place, the water supply was switched from a surface water source treated at the Fishers Lane Water Treatment Plant to a groundwater source treated at the Mint Farm Water Treatment Plant. While the new system provides water that meets all water safety and quality standards, a recent customer survey found that a large majority of water users (82%) are dissatisfied with their water.

Fishers Lane Water Treatment Plant (left) provided treated water from the Cowlitz River until 2013; the Mint Farm Water Treatment Plant (right) currently supplies treated groundwater

In response, the City of Longview and BHWSD initiated a study to evaluate options for improving water quality. This included establishing a Customer Advisory Committee (CAC). The CAC's objective is to provide recommendations for a sustainable, safe, and satisfactory water supply for Longview/BHWSD water customers.

Common concerns

The most common issues expressed by water customers include:

- Spots and residue
- Taste
- Color and staining
- Smell
- Indirect costs to customers, including damage to appliances and buying bottled water
- Fear of health impacts

The new groundwater supply has higher dissolved silica and hardness, which can cause spotting and mineral buildup on appliances and fixtures. The study is considering options to remove dissolved silica and reduce the hardness of the water.

Continued on next page >>

Illustration from the Customer Advisory Committee kick-off meeting identifying background on the issues and outlook for the study process

Fact Sheet | Page 1

Figure 11. A fact sheet provided an overview of the project

Project Fact Sheet – A project fact sheet was created to provide an overview of the project, the study process, options being considered and the timeline for completion. The Fact sheet was made available on the project website and at City Hall for countertop distribution, distributed at stakeholder interviews, and available at committee meetings and at the open house. The fact sheet and explanatory insert are attached in Appendix F.

Explanatory Videos – Two videos were developed in conjunction with the community open house and online open house and survey. The first video provided an overview of the study process and goals. The second video provided an overview of the 14 various water supply options being considered, including the CAC's two most preferred alternatives. The videos were posted on the project website and were highlighted at the community open house and as part of the online open house and survey.

Figure 12. The public open house drew more than 100 participants

Public Open House – On June 30, 2015 a public open house was held to share information with

the community on the study, evaluation process, and the water supply alternatives being considered; and to ask for input on the two primary water supply improvement options currently being considered. Community feedback generated via the open house was intended to inform the CAC's recommendation to the City Council and BHWSD Board on a Preferred Alternative. More than 100 members of the community attended. Thirty seven (37) comment forms were completed at the open house.

Virtual Open House and CAC Survey No. 2 – An online open house and survey were made available to the public from June 26 through July 6, in conjunction with the in-person open house. The survey was distributed to project stakeholders through the e-mail distribution list which included over 700 e-mails, the project website, a media release, an article in The Daily News, and roadside reader boards.

The online open house reviewed information similar to the boards presented at the physical open house, including the various water supply options that had been considered, and identified the two preferred by the CAC. A total of 323 people provided input either via the online survey or hard copy forms. Responses represented a wide distribution of respondents across the Longview/BHWSD water service areas.

Overall, the option that was chosen as the most "acceptable" by respondents was Ranney Collector on the Cowlitz River. This option received 224 (or 72%) "acceptable" responses. A new Surface Water Source on the Cowlitz River was a close runner-up, receiving 196 (or 64%) "acceptable" responses. The options that were chosen as the least acceptable by respondents due to the number of "not acceptable" responses were the Status Quo and Modified Distribution System (Mint Farm) options - 87% of respondents indicated these two options were "not acceptable."

A little over half of the total respondents ranked their most "acceptable" options. The results of that exercise showed that a new Surface Water Source on the Cowlitz River was selected as the first choice the most often (84 times); however, a Ranney Collector on the Cowlitz River is shown as having potentially broader appeal (since it was chosen more often as a second and third choice).

When asked whether or not the CAC should consider recommending interim treatment options to improve water quality during implementation of a new potential water supply system, the majority of respondents, 78 percent, felt that yes, the CAC should consider interim treatment options for the Mint Farm Water Supply.

Respondents were asked if they had any additional questions about the study or comments they'd like to share. A total of 131 people provided closing thoughts or comments.

Media Outreach – The City distributed three media releases throughout the project and numerous articles appeared in the Daily News and on the local radio station, KLOG.

4. CAC Recommendations

The CAC reconvened after the public open house to consider the input received at the open house and from the online survey. Based on those results and deliberation among the committee, **the CAC decided to recommend that the City Council proceed with developing a Ranney Collector on the Cowlitz River,** which will avoid more complex permitting and regulatory requirements related to smelt and sediment that would be encountered with a New Surface Water source**.** The CAC recommendation will be presented to a joint meeting of the City Council and District Board on August 20, 2015.

The CAC decided not to consider interim improvements and remain neutral on that issue, referring consideration of such improvements to the City Council and District Board. With regard to submitting a question about the water supply for a public vote, the CAC chose not to include that as part of its recommendation.

5. Project Implementation

Implementation of the recommendation for a Ranney Collector on the Cowlitz River will involve a number of steps, requiring an estimated 3 to 5 years to complete. Implementation will include a feasibility analysis, evaluating the viability, and testing the water quality of a Ranney Collector. One time-consuming element could be a state requirement to collect water quality information over the course of a full year. The preliminary list of implementation activities discussed with the CAC is shown in the box below.

Preliminary List of Implementation Activities

- Develop Scope of Work for Ranney Site Investigation
- Consultant/Driller Selection – Qualifications Based Selection Process
- Obtain Drilling Permit/Start Card
- Ranney Site Investigations – Water Quantity; Water Quality; Required Treatment
- Selection of Preferred Site(s)
- City Council/Commissioners Authorization to Proceed with Design
- Issue Revenue Bonds for Project Funding
- Environmental Review – NEPA/SEPA
- Site Acquisition and DNR Lease
- Application for Change of Place of Water Right Withdrawal
- Design of Ranney Collector Well
- State Approval of Well Design
- Bidding and Contract for Well Drilling
- Well Drilling and Horizontal well construction
- Well Testing for Treatment Needs – Confirm/Modify Treatment Based on Production Well Quality
- Develop Scope of Work for Pump Station and Treatment Facilities Design
- Pump Station and Treatment Design
- State Approval of Design
- Building and Construction Permitting
- Pump Station and Treatment Facilities Construction Bidding
- Pump Station and Treatment Facilities Construction
- Distribution System Flushing
- Pump Station and Treatment Facilities Start-up14. Blending – Columbia River Governance Agreements

Some steps could potentially be combined or done concurrently.

After the CAC presents its recommendations to the City Council and District Board, one of the first activities will be to refine the estimated time for implementation and the project costs. The CAC noted the urgency in making changes to the water supply system to alleviate customer concerns and dissatisfaction with their water.

Appendix A
CAC Application Form

Longview Drinking Water Improvement Study

Customer Advisory Committee Application

About the Customer Advisory Committee

The Longview City Council and Beacon Hill Water & Sewer District are forming a Customer Advisory Committee (CAC) that will meet regularly over the course of the next seven months to learn about the Longview water supply system, consider options to improve our drinking water, and make a recommendation to the City Council and Beacon Hill Water & Sewer District Board of Commissioners.

The committee will be comprised of 10 to 12 water customers served by Longview or Beacon Hill Water & Sewer District. This committee will be comprised of local community members having multiple interests and backgrounds, including residents from various neighborhoods, small business owners, industrial/commercial customers, healthcare providers, and environmental or engineering professionals, all to represent the community at large.

Role of the Customer Advisory Committee

The CAC will:

- Create an environment conducive to multiple and diverse opinions and ideas.
- Review and comment on technical data and materials prepared by staff and consultants.
- Discuss community concerns and balance interests in order to establish evaluation criteria that will help to narrow possible solutions to improving Longview's water supply.
- Ensure the preferred alternative for improving Longview's Water Supply is consistent with and supportive of the project purpose and need, as well as the evaluation criteria established by the CAC, with input from the community.
- Promote public understanding of the Longview Water Supply Alternatives.

CAC Member Qualification Guidelines

The following criteria will guide selection of members for the Longview Drinking Water Improvement CAC. These guidelines are intended to ensure the committee represents a cross-section of Longview and Beacon Hill water users. The City Council and Beacon Hill Water & Sewer District Commissioners will have final authority to appoint CAC membership that best represent all water users.

- Longview or Beacon Hill Water & Sewer District water customer.
- Relevant experience, interest or skills related to Longview's water issues (does not necessarily need to be technical experience).
- Ability to work with others in a committee setting, willingness to listen to others, ability to share opinions clearly and succinctly, openness to other points of view and ideas, ability to negotiate.
- Ability and interest in working for the community good and the right outcome for water customers of the City of Longview and Beacon Hill Water & Sewer District.
- Ability to represent the Longview and Beacon Hill communities and the means to share information/solicit feedback from those they represent.

CAC Member Qualification Guidelines (continued)

- Ability to attend each CAC meeting* throughout the duration of the project. Meetings will be approximately monthly and are anticipated to be held during the following weeks:
    - January 12
    - January 31 (Saturday - planned daytime site tour date)
    - February 23
    - March 16
    - April 13
    - May 18
    - June 8
- Interests needed on the CAC**:
    - Residential water customers from different parts of Longview and Beacon Hill
    - Business representatives (especially water-dependent businesses – large and small)
    - Multi-family property owner/manager
    - Education institution
    - Healthcare provider
    - Environmental or technical/engineering professional
    - Low/fixed income water customers

* Meetings are currently proposed to be held Tuesday evenings, but may be changed to accommodate the committee members' availability.
** Liaison representatives from the City Council and Beacon Hill Water & Sewer District Board of Commissioners will also participate on the Committee.

Selection Process

After reviewing the applications from those interested in being a member of the committee, the City Council will appoint 8 to 10 members at its December 23, 2014 meeting, and the Beacon Hill Water and Sewer District Board will appoint 2 members at its December 17, 2014 meeting. Those not selected for committee membership are encouraged to attend the CAC meetings as audience members to be kept informed about project progress and opportunities to remain engaged and provide feedback.

Contact Us

For more information, please contact:
Adrienne DeDona, Public Involvement Project Lead
360-993-0025
info@longviewwater.org.

Longview Drinking Water Improvement Study
Customer Advisory Committee Application

Application must be submitted by December 10, 2014.

1. Contact information

Name: _____

Mailing Address: _____

City: _____ State: _____ ZIP: _____

Email Address: _____

Phone Number: _____

2. What organization(s) and/or viewpoint(s) do you represent? (i.e. neighborhood resident, business owner, healthcare professional, environment or technical professional, etc.)

3. Who provides your water service? (Circle one.) Longview Water / Beacon Hill Water & Sewer District

4. How long have you lived or operated a business in the water service area?
Number of years: _____

5. If different than your mailing address, please provide the address of your residence or place of business within the water service area you have identified above.

Address: _____ City: _____

6. How did you hear about the opportunity to serve on the CAC?

7. Are you able to commit to attending all seven CAC meetings (most likely in the evenings), tentatively planned for the weeks of:

- January 12
- January 31 (Saturday - planned daytime site tour)
- February 23
- March 16
- April 13
- May 18
- June 8

☐ Yes, I can commit to those dates.

☐ No, I can't commit to the listed dates (list problematic dates below):

_____

8. Meetings are tentatively planned for Tuesday evenings. What are the best evenings for you to attend? (Check all that apply.)

☐ Mondays

☐ Tuesdays

☐ Wednesdays

☐ Thursdays

☐ Fridays

☐ Saturdays

☐ Sundays

9. What are the best time(s) of day for you to attend a two hour meeting?

☐ Mornings (9-11am)

☐ Middle of the day (11am-1pm)

☐ Early afternoon (1-3pm)

☐ Late Afternoon (3-5pm)

☐ Evenings (5-8pm)

10. Why are you interested in participating on the CAC? (1-4 sentences.)

11. How will you ensure your ability to see beyond your personal interests and engage in a productive dialogue with other committee members who may have different interests, to reach consensus on recommendations to the City Council and Beacon Hill Water & Sewer District Board? (1-4 sentences.)

12. What special skills, interests, experiences, or expertise would you bring to this process? (1-4 sentences.)

13. How do you plan to engage and share information about the Longview Drinking Water Improvement Study with your neighbors and other members of the community? (1-4 sentences.)

14. What opportunities do you see for this process? What do you want this study to accomplish and what do you hope to accomplish by participating? (1-4 sentences.)

Appendix B
CAC Meeting Protocols

Longview Drinking Water Improvement Study

Customer Advisory Committee

COMMITTEE PROTOCOLS
Approved February 24, 2015

A fourteen-member Customer Advisory Committee (CAC) has been appointed by the Longview City Council and the Beacon Hill Water and Sewer District (BHWSD) Board of Commissioners to learn about the Longview and BHWSD water supply system, consider options to improve our drinking water, and make a recommendation to the City Council and Beacon Hill Water & Sewer District Board of Commissioners.

One liaison representative each from the Longview City Council and the BHWSD Board will participate as non-voting members of the CAC.

Committee Purpose

The role of the Customer Advisory Committee is to:

- Create an environment conducive to voicing multiple and diverse opinions and ideas.
- Review and comment on technical data and materials prepared by the project team.
- Discuss community concerns and balance interests in order to establish evaluation criteria that will help to narrow possible solutions for improving Longview's water supply.
- Ensure the preferred alternative for improving Longview's water supply is consistent with and supportive of the project purpose and need, as well as the evaluation criteria established by the CAC, with input from the community.
- Promote public understanding of the Longview Drinking Water Improvement Alternatives.
- Advise the Longview City Council and BHWSD Board of Commissioners on all aspects of the Longview Drinking Water Review Study.

CAC meetings will serve as a forum for open, public dialogue about the study. The CAC will strive to represent a range of community interests and develop recommendations that are in the best interest of Longview and BHWSD water customers.

Committee Decision Making

As an advisory committee, we recognize that decision making is the responsibility of the Longview City Council and BHWSD Board of Commissioners. However, we also recognize the significant role we have in providing recommendations to the Council and the Board based upon our technical knowledge and familiarity with the Longview community and the water. To that end, we will:

- Work together to serve the purpose of this committee to make recommendations that are consistent with the agreed-upon goals and objectives for this study.
- Provide constructive suggestions for addressing issues and improving proposals.
- Set aside personal interests in order to seek the best recommendations for all stakeholders.
- Work toward consensus on all major committee recommendations. Consensus is the point at which all committee members can support the decision as the most viable decision for the group as a whole, although it may not be an individual member's personal favorite.
- If it is clear, after repeated attempts to find a solution all can support, that no consensus is possible, the committee's recommendation can include majority and minority opinions.
- If full committee consensus cannot be reached, a majority of CAC members present must reach consensus for a group advisement to be forwarded.
- A quorum consists of a minimum of eight (8) CAC members with at least one (1) BHWSD customer. For making major recommendations, a quorum must be present to move a recommendation forward. For routine decisions, a minimum of 5 members must be in attendance.
- All decisions will be "frozen" unless the committee reaches consensus that a decision needs to be revisited.

Process Protocols

<u>Meeting Preparation</u>

Committee members will:

- Commit to continued and consistent involvement in the process from start to finish. There will be no alternates or proxies if a member cannot attend a meeting.
- Read materials in advance of meetings.
- Be prepared to start meetings on time.
- Help end meetings on time. If agenda items cannot be completed on time, decide if the meeting should be extended or if an additional meeting should be scheduled.
- Formally declare any conflicts of interests (defined as any personal or family member's loss or gain as a result of the study or resultant possible project).
- Provide opportunities for public comments at the beginning or end of each meeting.
- Notify the meeting facilitator, Adrienne DeDona at Adrienne@jla.us.com or 360-903-4792, if unable to attend a meeting.

During Meetings

Committee members will:

- Focus questions and comments on the subject at hand and focus on successfully completing the agreed upon agenda.
- Treat everyone with respect. Be open to the group and other ideas.
- Let others finish before speaking. Share the air– let others speak once before speaking twice.
- Collaborate with other group members – seek to find common ground.
- Put aside personal agendas. Raise issues honestly, clearly and early in the process. This will help the group make recommendations about how to move forward.
- Consider the community as a whole in deliberations.
- Ask questions to ensure an understanding of the matters being discussed.
- Place name tents vertically on the table to indicate a desire to speak; wait for the facilitator to call on you.
- Put cell phones on silent mode.
- Participate!

Accessibility to the Public:

- While the primary purpose of the committee meetings is to provide a forum for the deliberation of the committee, meetings will be open to the public for observation.
- As needed, up to a total of ten minutes during each meeting will be reserved for all public comment. This amount may be extended by committee agreement, if needed and if time allows. The length of individual comments should be limited based on the number of individuals who wish to address the committee, but should be no more than three minutes.
- Interested members of the public are encouraged to provide more thorough comments in writing. Written comments from the public shall be delivered to the committee facilitator, who shall distribute the comments to all members of the committee.

Communication between Meetings

- Meeting materials will be distributed by e-mail, generally one week in advance of meetings, or mail by request (time permitting).

Between meetings, we will:

- Use only project email addresses to communicate with each other about project issues.
- Communications will be conducted in ways that support the group process and not take actions or discuss issues in way that undermine the group process.
- Requests for project, water supply, funding and other information from the City and BHWSD will be made through the facilitator. Responses to such requests will be provided to all committee members.

- Serve as conduits for information sharing. Share information with groups, organizations and/or constituents that the CAC represent. Gather information from our constituents that will inform committee deliberations.
- Funnel study related communications to the committee via the facilitator or during meetings.
- E-mail between meetings is for information and discussion only, not for decision-making outside of the committee meetings.
- In advance of the meeting, comments on non-agenda items or requests for information and data should be provided in writing. Committee members are encouraged to provide comments to Adrienne DeDona at least three days before meetings to allow CAC members time to review and reflect on comments. Comments received after that time will be provided to CAC members at the next meeting. Responses to requests for information will be determined by the project team on a case by case basis based upon available resources and relevance to the water supply study.
- Represent only our personal views on project matters and not appear to represent the views of the whole CAC or other individual members when engaged in other forums where study issues are under discussion, including contacts with the press.

Vincent Scalesse	Dave Hooper
David Patrick McCoy	Dave Quinn
Amber Olson	Raymond Colwell
Stephanie Owens	Orranda Chamberlain
Preston Worth	William (Bill) Beltz
Mark Bergeson	Phillip Dennis
Rich Kirkpatrick	Alissa Lee
Ken Botero	Bonnie Decius

Appendix C
Options Evaluation Framework

Longview Drinking Water Improvement Study
Options Evaluation Framework - Groups
April 2015

	Values	Customer Perception (High quality, no toxic risk)						Technical (Sustainable)								Cost (Affordable)			
	Criteria	Spotting/ Residue	Taste	Color	Smell	General Health Concerns	Purity/ Cleanliness	Long-term Capacity	Reliability	Environmental Impacts	Time to Permit, Construct, and Implement	Difficulty to Meet Regulatory Requirements	Time it Takes to Transition from Current Supply to Different Supply	Governance Agreements	Operability/ Complexity	Impact on customer rates	Indirect cost to customers	Effect on Property Values	Potential Litigation Cost to City
	Rating question	How does this option perform in terms of minimizing Spotting/ residue?	How does this option perform in terms of minimizing undesirable taste in the water?	How does this option perform in terms of minimizing color in the water?	How does this option perform in terms of minimizing objectionable smell in the water?	How does this option perform in terms of minimizing customers' General Health Concerns about the water?	How does this option perform in terms of instilling customer confidence in the safety of the water?	How does this option perform in terms of providing capacity to serve long-term water needs?	How does this option perform in terms of maximizing reliability following natural or man-made events?	How does this option perform in terms of minimizing the amount of electrical energy or other resources consumed?	How does this option perform in terms of the time to permit, construct, and implement?	How does this option perform in terms of the number and complexity of regulatory permits required?	How does this option perform in terms of the time it takes to transition from the existing supply to another?	How does this option perform in terms of retaining autonomy or enhancing regional cooperation?	How does this option perform in terms of how much there is that can go wrong in the treatment and supply process?	What is the effect of this option on average month bill?	How does this option perform in terms of minimizing indirect costs to customers	How does this option perform in terms of changes in property values due to the water quality?	How does this option perform in terms of avoiding potential costs for litigation due to the water quality?
	Weights>>	10.6	5.6	5.4	5.5	8.6	9.1	6.2	6.4	3.1	3.0	4.2	3.2	3.3	2.9	6.5	7.3	4.6	4.5
SCORES		**SCORE DEFINITIONS**						**SCORE DEFINITIONS**								**SCORE DEFINITIONS**			
5		No noticeable spotting	No discernable taste	No color in the water	No objectionable smell in the water	Causes no concerns about general health	A large majority of customers have high level of confidence in the safety of the water	Provides 100% of 20-year projected demand	Supply expected to be returned to service within 3 days of event	Least amount of electrical energy or other resources consumed	One year or less	Few, non-complex permits required	No transition time	City owns supply system	Treatment process is least complex	Dollar amount of monthly increase from Status Quo for residential customer	Little or no indirect cost to customers due to water quality	Real or perceived increase in property values due to water quality	No potential cost of litigation due to water quality
4		Little noticeable spotting	Little discernable taste	Little color in the water	Little objectionable smell in the water	Causes little concern about general health	A majority of customers have confidence in the safety of the water										Minor indirect cost to customers due to water quality	Potential real or perceived increase in property values due to water quality	Little potential cost of litigation due to water quality
3		Moderate spotting	Some, acceptable taste	Moderate, acceptable color in the water	Moderate, acceptable smell in the water	Creates some concerns about general health	Similar numbers of customers have confidence versus have concerns about safety of the water	Provides 50% to less than 100% of 20-year projected demand	Supply expected to be returned to service within 2 weeks of event	Moderate amount of electrical energy or other resources consumed	Approximately 3 years	Moderate number or complex permits required	Up to 3 months transition time	Ownership of supply shared with another entity	Treatment process has moderate complexity		Moderate indirect cost to customers due to water quality	No real or perceived change in property values due to water quality	Moderate potential cost of litigation due to water quality
2						Creates wide-spread moderate concerns about general health	A majority of customers have concern about safety of the water											Potential real or perceived decrease in property values due to water quality	
1		Heavy/noticeable spotting	Poor, undesirable taste	Readily noticeable color in the water	Highly noticeable, objectionable smell in the water	Creates wide-spread serious concerns about general health	Widespread concern about safety of the water among customers	Provides less than 50% of 20-year projected demand	Supply expected to be out of service more than 4 weeks after event	Greatest amount of electrical energy or other resources consumed	Approximately 5 years or more	Large number and complex permits required	More than 3 months transition time	Requires purchase of water from another entity, no ownership	Treatment process is most complex		Significant indirect cost to customers due to water quality	Real or perceived decrease in property values due to water quality	High potential cost of litigation due to water quality

Appendix D
Complete List of Water Supply Improvement Options Considered

Longview Drinking Water Improvement Study
Water Supply Improvement Options Complete
March 2015

Category	Source	Option ID	Description
Status Quo	Mint Farm Wellfield	A	No Additional Treatment; Optimize Existing Mint Farm Water Treatment Plant (WTP)
Wells	Mint Farm Wellfield	B	Add Dissolved Oxygen to Mint Farm WTP
		C	Add Post Chlorination to Mint Farm WTP
		D	Add Softening to Mint Farm WTP
		E	Add Silica Removal to Mint Farm WTP
		E_2	Isolate Well Screens in potential Silica strata layer(s) at Mint Farm WTP
		E_3	Utilize Scavenger Wells at Mint Farm WTP
	Unspecified Location	F	Other Groundwater Sources
Distribution/ Transmission System Changes	Mint Farm Wellfield	G	Add Chlorine Booster Stations to Distribution System
		H	Add Dissolved Oxygen Injection to Distribution System
		I	Replace Pipes in Distribution System
		J	Mint Farm WTP Finished Water Conveyed to Fishers Lane for Connection to Distribution System
Surface Source	Cowlitz River	K	Rehabilitate Fishers Lane WTP and Existing Intake
		L	Rehabilitate Fishers Lane WTP with New Cowlitz River Intake Near Existing (within 5 miles +/-)
		M	Rehabilitate Fishers Lane WTP with New Cowlitz River Intake above Toutle River
		N	Replace Fishers Lane WTP with New Cowlitz River Intake Near Existing (within 5 miles +/-)
		O	Replace Fishers Lane WTP with New Cowlitz River Intake above Toutle River
		P	Rehabilitate Cowlitz River Intake; Treat at Mint Farm WTP
		Q	New Cowlitz River Intake (within 5 miles +/-); Treat at Mint Farm WTP
		R	Rehabilitate Cowlitz River Intake; Clarification at Fishers Lane and Filtration at Mint Farm WTP
		S	New Cowlitz River Intake (within 5 mi +/-); Clarification at Fishers Lane and Filtration at Mint Farm WTP
	Columbia River	T	Columbia River Intake with New WTP
		U	Columbia River Intake; Treat Water at Mint Farm WTP
		V	Columbia River Intake; Treat Water at New/Rehabilitated Fishers Lane WTP
	Unspecified Location	W	New Upland Water Source with Surface Dam and Treatment
	Aqueduct	W_2	Conveys surface water to treatment plant in open channel
Ranney Collector	Cowlitz River	X	Ranney Collectors on Cowlitz River Downstream; Treat at Fishers Lane WTP
		Y	Ranney Collectors on Cowlitz River Downstream; Treat at Mint Farm WTP
		Z	Ranney Collectors on Cowlitz River Downstream with new WTP at New Location
		AA	Ranney Collectors near Fishers Lane; Treat at Fishers Lane WTP
		AB	Ranney Collectors near Fishers Lane; Treat at Mint Farm WTP
		AC	Ranney Collectors near Lexington; Treat at Fishers Lane WTP
		AD	Ranney Collectors near Lexington; Treat at Mint Farm WTP
		AE	Ranney Collectors and new WTP near Lexington
	Columbia River	AF	Ranney Collectors on Columbia River; Treat at Mint Farm WTP
		AG	Ranney Collectors on Columbia River; Treat at Fishers Lane WTP
		AH	Ranney Collector on Columbia River with WTP at New Location
	Kalama River	AI	Ranney Collector on Kalama River
Aquifer Storage & Recovery (ASR)	Cowlitz River	AJ	ASR at Mint Farm WTP; Rehabilitate Fisher's Lane WTP and Intake
	Cowlitz River	AK	ASR at Mint Farm with New Cowlitz River Intake and WTP
	Cowlitz River	AL	ASR at Mint Farm with Cowlitz River Ranney Collector
	Columbia River	AM	ASR at Mint Farm with Columbia River Ranney Collector
	Columbia River	AN	ASR at Mint Farm with Columbia River Intake and Treatment
Blending	Cowlitz River and Mint Farm	AO	Cowlitz River Blending with Mint Farm WTP; Surface Intake or Ranney Collectors
	Columbia River and Mint Farm	AP	Columbia River Blending with Mint Farm WTP; Surface Intake or Ranney Collectors
Regional/ Intergovernmental	Cowlitz River	AQ	Connect to City of Kelso System
		AR	Joint Expansion with City of Kelso; Ranney Collectors and Treatment
	Columbia River	AS	Connect to Port of Kalama Ranney Collector
	Kalama River	AT	Connect to City of Kalama Ranney Collector
Private/Public Partnership	Columbia River	AU	Utilize Weyerhaeuser or Kapstone Surface Water System
End User Treatment	Mint Farm Wellfield	AV	Customer Treatment Systems - Whole house, City-owned
		AW	Customer Treatment Systems - Whole house, Resident-owned
		AX	Customer Treatment System at the Faucet, Resident-owned
Non-Infrastructure	Mint Farm Wellfield	AY	Conduct Public Education about Water Purity, Safety, Aesthetics, Comparisons with Other Cities
		AZ	Conduct Public Education about Using Hard Water, Preventing and Removing Water Spots
		BA	Provide Products for Preventing and Removing Water Spots

Appendix E
Water Supply Improvement Options Evaluation and Costs

Longview Drinking Water Improvement Study
Options Evaluation and Costs
June 4, 2015

Category	Source	Option ID	Description	Customer Perception						Technical Feasibility								Construction Cost			Capital Cost	O&M	Costs			
			Legend: ✓=Addresses Issue, ?= Not enough Information, __=Does Not Address Issue	Spotting	Taste	Color	Smell	General Health	Purity, Cleanliness	Long-Term Capacity	Reliability	Environmental Impacts	Time to Implement	Regulatory Requirements	Transition Time	Governance Agreements	Operation Complexity	Source ($Millions)	Transmission ($Millions)	Treatment ($Millions)	Capital Cost ($Millions)	Annual O&M Cost ($Millions)	**Impact to Monthly Bill**	Indirect Costs to Customers	Effect on Property Values	Potential Litigation Cost
Status Quo	Mint Farm Wells	A	No Additional Treatment - Optimize Existing			✓				✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	-	**-**			
Wells	Mint Farm Wells	B	Add Dissolved Oxygen to Mint Farm WTP		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	-	-	$2	$2	$0.0	**$0.7**			
		C	Add Post Chlorination to Mint Farm WTP		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	-	-	$0.2	$0.2	$0.0	**$0.1**			
		D	Add Softening to Mint Farm WTP		✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	-	-	$15	$18	$2.7	**$16**			
		E	Add Silica Removal to Mint Farm WTP (Reverse Osmosis)	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		-	-	$34	$41	$3.4	**$25**	✓	✓	✓
		E-0	Add Silica Removal to Mint Farm WTP (pH Adjustment and Precipitation)	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		-	-	$15	$18	$2.8	**$16**	✓	✓	✓
		E-1	Add Silica Removal to Mint Farm WTP (pH Adjustment and Electrocoagulation)	✓	✓	✓	✓		✓	✓	?	✓		✓	✓	✓		-	-	$15	$18	$2.9	**$17**	✓	✓	✓
		E2	Isolate Well Screens in Potential Silica strata layers at Mint Farm WTP	?	?	?	?	?	?	?	?	✓		✓	✓	✓	✓	-	-	$0.5	$0.6	$0.0	**$0.2**			
		E3	Utilize Scavenger Wells at Mint Farm WTP	?	?	?	?	?	?	?	?	✓		✓	✓	✓	✓	$2	-	-	$2	$0.1	**$1**			
	New Wellfield	F	Other Groundwater Sources	?	?	?	?	?	?	?	?	?	?	?	?	?	✓	$2	$16	-	$22	$0.0	**$7**			
Distribution Changes	Mint Farm Wells	G	Add chlorine booster pump station		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	-	-	$0	$0	$0.0	**$0.1**			
		H	Add Dissolved Oxygen to Distribution System		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	-	-	$2	$2	$0.0	**$0.7**			
		I	Replace Pipes in Distribution System							✓	✓	✓		✓	✓	✓	✓	-	$190	-	$230	$0.0	**$70**			
		J	Mint Farm WTP Finished Water Conveyed to Fisher's Lane WTP for Distribution							✓		✓		✓	✓	✓	✓	-	$15	$5	$25	$0.2	**$8**			
Surface Source	Cowlitz River	K	Rehabilitate Fisher's Lane WTP and Existing Intake	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	$4	-	$28	$39	$0.9	**$15**	✓	✓	✓
		L	Rehabilitate Fisher's Lane WTP with New Intake within 5 Miles	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$28	$60	$0.9	**$22**	✓	✓	✓
		M	Rehabilitate Fisher's Lane WTP with New Intake above Toutle River	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$45	$28	$95	$0.9	**$32**	✓	✓	✓
		N	New WTP with Intake within 5 Miles	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$69	$109	$0.9	**$37**	✓	✓	✓
		O	New WTP with Intake above Toutle River	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$45	$69	$144	$0.9	**$47**	✓	✓	✓
		P	Rehabilitate Existing Intake, Treat at Mint Farm WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$4	$15	$62	$98	$0.0	**$30**	✓	✓	✓
		Q	New Cowlitz Intake within 5 miles, Treat at Mint Farm WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$62	$101	$0.0	**$31**	✓	✓	✓
		R	Rehabilitate Cowlitz River Intake, Clarification at Fisher's Lane WTP, Filtration at Mint Farm WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$4	$15	$21	$48	$0.4	**$16**	✓	✓	✓
		S	New Cowlitz River Intake within 5 Miles, Clarification at Fisher's Lane WTP, Filtration at Mint Farm WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$21	$51	$0.4	**$17**	✓	✓	✓
	Columbia River	T	Columbia River Intake with New WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$69	$109	$0.9	**$37**	✓	✓	✓
		U	Columbia River Intake, Treat Water at Mint Farm WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$21	$51	$0.0	**$15**	✓	✓	✓
		V	Columbia River Intake Treat Water at Fisher's Lane WTP	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	$5	$16	$28	$60	$0.9	**$22**	✓	✓	✓
	N/A	W	New Upland Water Source with Surface Dam and Treatment	?	?	?	?	?	?	?	?	?		?		?	?	$25	$45	$69	$168	$0.9	**$55**	✓	✓	✓
		W2	Conveys Surface Water to Treatment Plant in an Open Channel	?	?	?	?	?	?	?	?	?		?		?	?	$5	$89	$69	$199	$0.9	**$64**	✓	✓	✓
Ranney Collector	Cowlitz River	X	Ranney Collector Downstream, Treat at Fisher's Lane WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$13	$28	$69	$0.9	**$24**	✓	✓	✓
		Y	Ranney Collector Downstream, Treat at Mint Farm WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$13	-	$34	$0.0	**$10**	✓	✓	✓
		Z	Ranney Collector Downstream with New WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$13	-	$34	$0.0	**$10**	✓	✓	✓
		AA	Ranney Collector Near Fisher's Lane, Treat at Fisher's Lane	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	-	$28	$53	$0.4	**$18**	✓	✓	✓
		AB	Ranney Collector Near Fisher's Lane, Treat at Mint Farm WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$15	-	$37	$0.0	**$11**	✓	✓	✓
		AC	Ranney Collector Near Lexington, Treat at Fisher's Lane WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$16	-	$38	$0.4	**$13**	✓	✓	✓
		AD	Ranney Collector Near Lexington, Treat at Mint Farm WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$13	$28	$69	$0.0	**$21**	✓	✓	✓
		AE	Ranney Collector and New WTP Near Lexington	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$16	-	$38	$0.9	**$15**	✓	✓	✓
	Columbia River	AF	Ranney Collector on Columbia River, Treat at Mint Farm WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$13	-	$34	$0.0	**$10**	✓	✓	✓
		AG	Ranney Collector on Columbia River, Treat at Fisher's Lane WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$16	$28	$73	$0.4	**$24**	✓	✓	✓
		AH	Ranney Collector on Columbia River with New WTP	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$13	-	$34	$0.9	**$14**	✓	✓	✓
	Kalama River	AI	Ranney Collector on Kalama River (Treat at Mint Farm WTP)	✓	✓	✓	✓	✓	✓	?	?	✓		✓		✓	✓	$16	$22	-	$46	$0.0	**$14**	✓	✓	✓
Aquifer Storage and Recovery (ASR)	Cowlitz River	AJ	ASR at Mint Farm WTP, Rehabilitate Fisher's Lane WTP and Intake	✓	✓	✓	✓		✓	?	?	✓		✓		✓	✓	$4	$15	$19	$46	$0.3	**$15**	✓	✓	✓
		AK	ASR at Mint Farm WTP, New Cowlitz River WTP and Intake	✓	✓	✓	✓		✓	?	?	✓		✓		✓	✓	$5	$16	-	$26	$0.6	**$10**	✓	✓	✓
		AL	ASR at Mint Farm WTP, with Cowlitz River Ranney Collector (and Treatment at Mint Farm WTP)	✓	✓	✓	✓		✓	?	?	✓		✓		✓	✓	$8	$15	-	$27	$0.0	**$8**	✓	✓	✓
	Columbia River	AM	ASR at Mint Farm with Columbia River Ranney Collector (Mint Farm WTP)	✓	✓	✓	✓		✓	?	?	✓		✓		✓	✓	$8	$13	-	$25	$0.0	**$8**	✓	✓	✓
		AN	ASR at Mint Farm with Columbia River and New WTP	✓	✓	✓	✓		✓	?	?	✓		✓		✓	✓	$8	$13	$46	$81	$0.6	**$27**	✓	✓	✓
Blending	Cowlitz River	AO	Cowlitz River Blending with Mint Farm WTP, Surface Intake or Ranney Collector	✓	✓	✓	✓		✓	✓	✓	✓		✓		✓	✓	$3	$16	$34	$64	$0.4	**$21**	✓		
	Columbia River	AP	Columbia River Blending with Mint Farm WTP, Surface Intake or Ranney Collector	✓	✓	✓	✓		✓	✓	✓	✓		✓		✓	✓	$3	$13	$34	$60	$0.4	**$20**	✓		

Appendix F
Project Fact Sheet and Water Supply Alternatives Explanatory Insert

CITY OF LONGVIEW WASHINGTON

BEACON HILL WATER AND SEWER DISTRICT

Longview Drinking Water Improvement Study

Updated June 18, 2015

Project overview

The City of Longview and the Beacon Hill Water & Sewer District (BHWSD) supply drinking water to 45,000 customers in the region. In 2013, due to various upgrades needed to the aging system that was in place, the water supply was switched from a surface water source treated at the Fishers Lane Water Treatment Plant to a groundwater source treated at the Mint Farm Water Treatment Plant. While the new system provides water that meets all water safety and quality standards, a recent customer survey found that a large majority of water users (82%) are dissatisfied with their water.

Fishers Lane Water Treatment Plant (left) provided treated water from the Cowlitz River until 2013; the Mint Farm Water Treatment Plant (right) currently supplies treated groundwater

In response, the City of Longview and BHWSD initiated a study to evaluate options for improving water quality. This included establishing a Customer Advisory Committee (CAC). The CAC's objective is to **provide recommendations for a sustainable, safe, and satisfactory water supply for Longview/BHWSD water customers**.

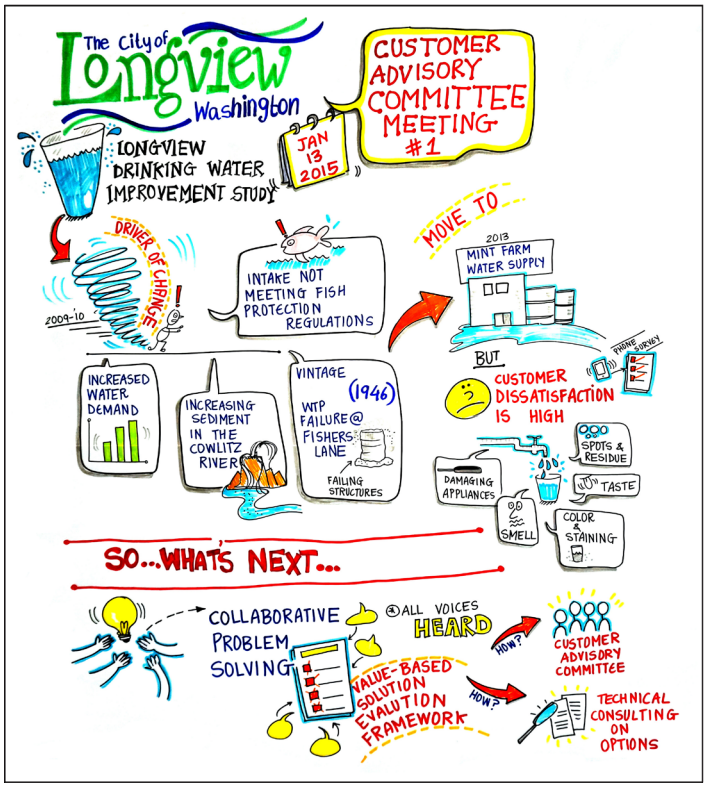


Illustration from the Customer Advisory Committee kick-off meeting identifying background on the issues and outlook for the study process

Common concerns

The most common issues expressed by water customers include:

- Spots and residue
- Taste
- Color and staining
- Smell
- Indirect costs to customers, including damage to appliances and buying bottled water
- Fear of health impacts

The new groundwater supply has higher dissolved silica and hardness, which can cause spotting and mineral buildup on appliances and fixtures. The study is considering options to remove dissolved silica and reduce the hardness of the water.

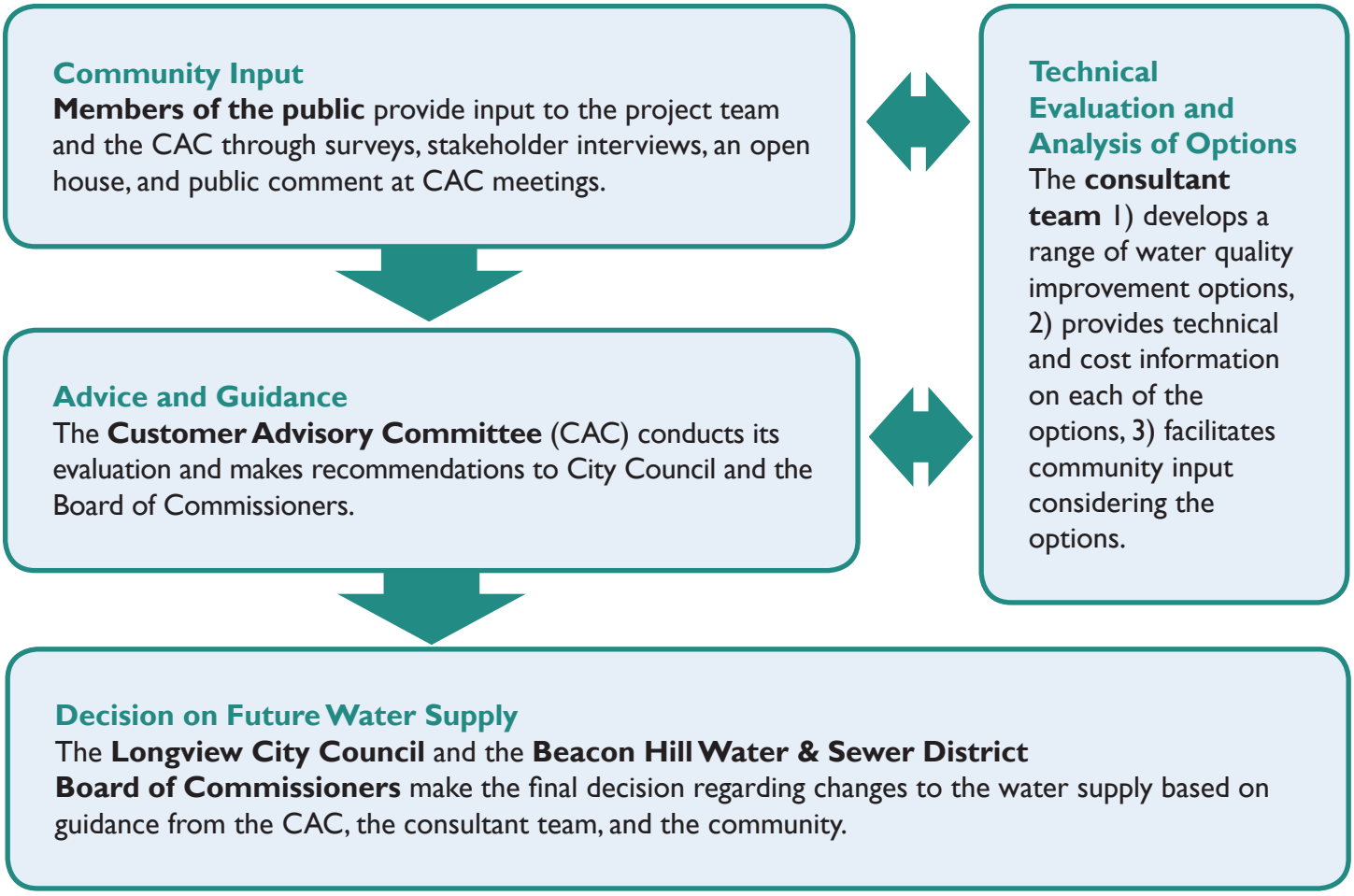
Continued on next page >>

Iron, manganese and chlorine levels contribute to the issues of taste, odor, and color of the water. Levels continue to be monitored in order to ensure safety and quality; however, changing the taste, odor and color characteristics of the drinking water have been a major focus of the study.

While heard less frequently than other issues, there have been reports of the water affecting customers' health. Reports of skin rashes, upset stomachs and other ailments have been attributed to the change in drinking water. The water is regularly monitored and tested and it meets all water safety and quality standards; however, customer complaints are taken seriously and are being considered during the study.

CAC recommendation process

The Longview City Council and the BHWSD Board of Commissioners are responsible for making the final decision regarding changes to the water supply. However, the CAC plays a key role in recommending the best course of action. All parts of the process will be informed by technical information from the project team and feedback from the community.



Evaluation criteria

To help sort through the options, the CAC adopted an evaluation framework that includes community values, customer perspectives, technical considerations and cost. The criteria are grouped under three key values:

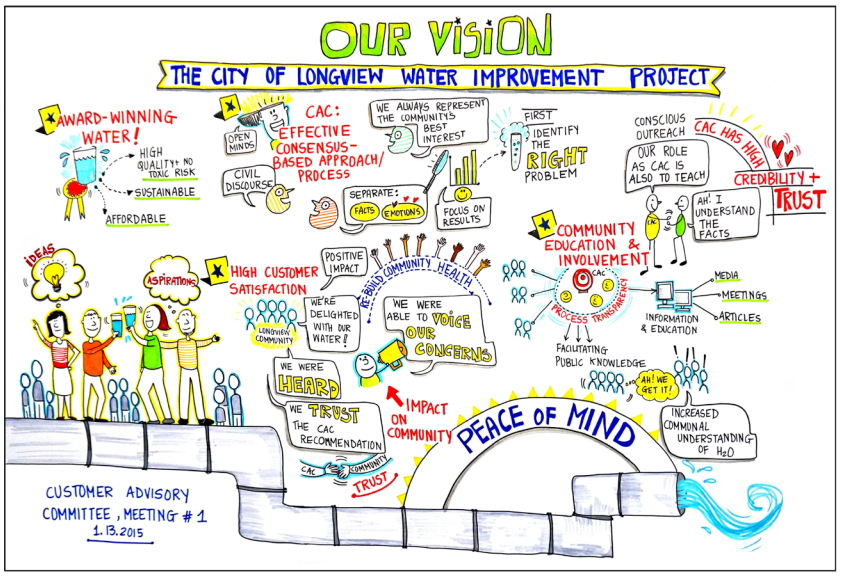


Illustration of the vision created by the CAC during their first meeting; this vision is reflected in the CAC's objectives and evaluation criteria

- Key Value #1: Improve **customer perception** about the water supply with respect to it being high quality and having no toxic risk. This category includes criteria such as taste, smell, spotting and health concerns.
- Key Value #2: The recommendation should be **technically feasible** and **have long-term viability**. This category includes criteria such as long-term capacity, reliability, operability and permitting considerations.
- Key Value #3: Consider the **cost and affordability** of water, both in terms of rates paid and indirect costs to customers for bottled water, appliance repair, in-home treatment or other similar costs.

Options considered

The range of possible options came from research by the technical consultant, as well as input from city staff, CAC members and the community. The initial list included more than 50 possible courses of action, which were grouped to make it manageable to consider benefits and drawbacks.

Group of options	*Type of change*	*Source*
Stay the course	No change; status quo	Mint Farm wellfield
Modified well source	Change in treatment of the well water or changes in the distribution/transmission system	Mint Farm wellfield
Change to a surface water source	Surface water may be sourced above ground or via a Ranney collector well; and could include Aquifer Storage and Recovery (ASR) or blending surface water with well water	Cowlitz River, Columbia River or other surface water source
Buy water from or collaborate with another entity	Regional/intergovernmental agreement	Cowlitz River, Columbia River or Kalama River
End user treatment	Treatment at the individual home/business level	Mint Farm wellfield
Non-infrastructure	Products and education to deal with water issues	Mint Farm wellfield

Project timeline

The CAC and technical team activities that will lead to recommendations are shown below, along with opportunities for input from the community.

	2014	2015							
	<	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
CAC activities	Applications for Community Advisory Committee (CAC)	**CAC Meeting 1, Jan.13:** Background and charge, community discussion, goals and expectations	**CAC Meeting 2, Jan. 31:** Finalize chartering, water treatment plant tours	**CAC Meeting 3, Feb. 24:** Develop values and criteria; review complete set of options and option groups	**CAC Meeting 4, Mar. 17:** Finalize and prioritize values and criteria	**CAC Meetings 5, 6, 7, 8 (Apr. 14; May 19; Jun. 9, Jul. 16)** Evaluate options, narrow to top rated options, select preferred alternative			**Aug. 20: CAC workshop with Council and District Board**
Public input opportuni-ties	Customer phone survey	Public comment period at CAC meetings throughout project		Stakeholder interviews & community survey			Open house, online survey & video		Comment period on preferred alternative
Technical evaluation	Develop options & confirm water needs	Assess Fishers Lane water treatment plant		Evaluate options			Develop top rated options		Document process, results report

Contact Us

Adrienne DeDona, Public Involvement Project Lead, (360) 993-0025, info@longviewwater.org

Go online for more information

The project website and city website contain additional information on Longview's water supply, including:

- Fact sheets on hard water, iron, manganese and silica
- Customer Advisory Committee meeting dates and information
- Answers to frequently asked questions

www.LongviewWater.org

Longview Water Supply Alternatives

From an initial list of more than 50 options, the Customer Advisory Committee (CAC) selected the most promising alternatives based on the key values of **customer perception**; **technical feasibility and long-term viability**; and **cost to rate payers**. The alternatives have been grouped into 14 clusters to make them easier to compare.

The table on the reverse lists the clusters and how they compare against the three key values. The two clusters that are currently preferred by the CAC are indicated in the table.

Cost Estimations

Costs provided in the table are rough estimates. While it is difficult to estimate costs at these very preliminary stages, these estimates are intended to allow for comparison among the various options. Cost ranges represent the variations among specific options within each cluster.

Information About the Options

Groundwater (well) source – Groundwater comes from underground aquifers tapped by wells. Groundwater is generally safer than surface water and requires less treatment but often has higher levels of dissolved minerals, silica and hardness, which cause many of the current complaints about taste, smell, color and spotting with Longview's drinking water. The public has also expressed concern regarding the proximity of the Mint Farm wells to former and current industrial sites.

- Several options to modify the Mint Farm wells and treatment process have been considered, each of which would address concerns differently (see reverse).
- Switching to a new groundwater source at a different location has also been considered, but requires more study to determine if the new water quality would be better than existing.

Surface water source – Surface water would be drawn directly from one of the region's rivers, such as the Cowlitz, Columbia or Kalama. These options generally have lower levels of minerals, silica and hardness, but can present technical challenges, such as high levels of silt, more expensive treatment, and environmental permitting requirements.

- It is assumed these options would address taste, odor, color, spotting, purity and general health concerns because surface water generally has lower levels of minerals, silica and hardness.

Example of a surface water intake structure

Ranney collector well – A Ranney collector is a well used to extract water from an aquifer with connection to a surface water source, such as a river. The purpose of a Ranney collector would be to obtain water quality similar to surface water, but without the regulations and technical difficulties associated with directly withdrawing water from the river.

- It is assumed these options would provide water quality similar to surface water and would address concerns related to taste, odor, color, spotting, purity and general health.

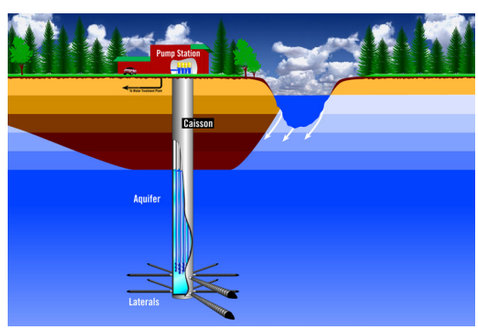


Diagram of a Ranney collector well

Aquifer Storage and Recovery (ASR) – ASR is the injection of potable water into an aquifer for later recovery and use (for example, surface water may be injected into an aquifer during the winter and withdrawn during the summer in periods high demand). The purpose of this option would be to obtain surface water quality but avoid complications such as regulations affecting when surface water can be withdrawn from the river.

- These options would likely improve issues related to taste, smell, color and spotting; however, this option may not fully address water quality concerns because ASR water would be stored in the aquifers currently in use and may absorb some of the minerals.

Blending – Blending options would involve mixing water from a new water source with groundwater from the Mint Farm wellfield. These options would improve water quality at a lower cost to rate payers compared to completely replacing the Mint Farm wellfield source.

- These options would likely improve issues related to taste, smell, color and spotting; however, these options may not fully address water quality concerns because the current groundwater would continue to be used.

Water Supply Option Cluster	Customer Perception (spotting, taste, smell, color, purity & general health concerns)	Technical Feasibility and Long-term Viability	Approx. Additional Cost to Rate Payers
Mint Farm Well Source			
Status Quo – No Additional Treatment / Optimize Existing Treatment Process	Would not address concerns related to spotting, taste, smell, purity or general health.	Meets long-term capacity, reliability, permitting and operating requirements.	No additional increase in rates; however, there are indirect costs to customers.
Modify Existing Treatment Processes	Some treatment technologies could address spotting, purity, taste, color, and odor issues; however, it's unclear whether this option would address health concerns.	Most technologies would meet the capacity, reliability, permitting and operating requirements. Complete within 3 years.	$1 to $25 per month increase
Modify Distribution System	May improve taste, color, and odor issues. Would not address concerns related to spotting (from silica), purity, or general health.	Meets long-term capacity, reliability, permitting and operating requirements. Treatment modifications could be completed within 3 years; distribution system replacement would be phased over 20 years.	$1 to $70 per month increase
Cowlitz River Source			
▶ Surface Water Source ***CAC Preferred Option***	Addresses concerns related to taste, odor, color, spotting, purity and general health.	Meets long-term capacity, reliability and operating requirements. Permitting will be difficult. Approximately 5 years to complete.	$15 to $47 per month increase
▶ Ranney Collector ***CAC Preferred Option***	Addresses concerns related to taste, odor, color, spotting, purity and general health.	More analysis is needed to determine if this would meet long-term capacity and reliability requirements. Up to 3 years to complete.	$10 to $24 per month increase
Aquifer Storage and Recovery (ASR)	Would improve issues related to taste, odor, color, and spotting. Would not address purity and general health concerns because ASR water would be stored in the aquifers currently in use.	More analysis is needed to determine if this would meet long-term capacity and reliability requirements. Permitting a surface withdrawal will be difficult. Up to 5 years to complete.	$8 to $15 per month increase
Blending Surface or Ranney Collector Water with Groundwater	Would improve issues related to taste, odor, color, and spotting. Would not address purity and general health concerns related to current groundwater.	More analysis is needed to determine if this option would meet long-term capacity and reliability requirements. Permitting will be difficult. Up to 5 years to complete.	$21 per month increase
Columbia River Source			
New Surface Water Source	Addresses concerns related to taste, odor, color and spotting. Members of the CAC have expressed concern regarding purity and general health issues.	Meets long-term capacity, reliability and operating requirements. Permitting will be difficult. Approximately 5 years to complete.	$15 to $37 per month increase
Ranney Collector	Addresses concerns related to taste, odor, color, and spotting. CAC members have expressed concern regarding purity and general health issues.	More analysis is needed to determine if this option would meet long-term capacity and reliability requirements. Up to 3 years to complete.	$10 to $27 per month increase
Aquifer Storage and Recovery (ASR)	Would improve issues related to taste, odor, color, and spotting. Would not address general health concerns because ASR water would be stored in the aquifers currently in use and because CAC members have expressed concern regarding purity and general health issues.	More analysis is needed to determine if this option would meet long-term capacity and reliability requirements. Permitting surface withdrawal will be difficult. Up to 5 years to complete.	$8 to $24 per month increase
Blending Surface or Ranney Collector Water with Groundwater	Would improve issues related to taste, odor, color, and spotting. Would not address purity and general health concerns related to current groundwater. CAC members have expressed concern regarding purity and general health issues.	More analysis is needed to determine if this option would meet long-term capacity and reliability requirements. Permitting will be difficult. Up to 5 years to complete.	$20 per month increase
Other Sources			
New Wellfield Source – Other Groundwater Sources	More analysis is needed to determine whether this option would address concerns related to spotting, taste, smell, purity or general health concerns.	More analysis is needed to know whether this would be technically viable and to determine the time required to complete.	$7 per month increase
New Surface Water Source – New Upland Water Source with Surface Dam and Treatment / Convey Surface Water to Treatment Plant in Open Channel	More analysis is needed to determine if this option would address concerns related to taste, odor, color, spotting, purity and general health.	More analysis is needed to determine if this option would meet long-term capacity and reliability requirements and to determine the time required to complete.	$55 to $64 per month increase
Kalama River Source – Ranney Collector	Addresses concerns related to taste, odor, color, spotting, purity and general health.	More analysis is needed to determine if this option would meet long-term capacity and reliability requirements. Up to 3 years to complete.	$14 per month increase